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From: Haas, Wendy
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1661

103 stem disc 1-5
102 leaf base 1, 3-5

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Please retrieve and forward to me a copy of each of the following references:

(1) Establishment of a novel tissue culture method, stem-disc culture, and its practical application to micropropagation of garlic (.Allium sativum L.).
AUTHOR: Ayabe M; Sumi S(a)
AUTHOR ADDRESS: (a)Inst. Biotechnol. Res., Wakunaga Pharm. Co., 1624 Shimokotachi, Koda-Cho, Takata-Gun, Hiroshima **Japan
JOURNAL: Plant Cell Reports 17 (10):p773-779 July, 1998
ISSN: 0721-7714

(2) Thermotherapy in virus elimination from garlic: Influences on shoot multiplication from meristems and bulb formation in vitro.
AUTHOR: Robert Ucman; Zel Jana(a); Ravnikar Maja
AUTHOR ADDRESS: (a)Natl. Inst. Biol. Ljubljana, Vecna pot 111, 1000 Ljubljana**Slovenia
JOURNAL: Scientia Horticulturae (Amsterdam) 73 (4):p193-202 April 16, 1998

(3) In vitro elimination of onion yellow dwarf and shallot latent viruses in shallots (Allium. cepa var. ascalonicum L.).
AUTHOR: Fletcher P J(a); Fletcher J D(a); Lewthwaite S L
AUTHOR ADDRESS: (a)New Zeal. Inst. Crop Food Res. Ltd., Private Bag 4704, Christchurch**New Zealand
JOURNAL: New Zealand Journal of Crop and Horticultural Science 26 (1):p 23-26 March, 1998
ISSN: 0114-0671

(4) Effects of plant growth regulators and cold pre-storage of bulb on callus formation of garlic.
AUTHOR: Kudou Rika; Fujime Yukihiro; Komatsu Yoshie; Fukada Noriko; Amimoto Kunihoro
AUTHOR ADDRESS: Shikoku Res. Inst. Inc., 2109 Yashima-nishimachi, Takamatsu 761-01**Japan
JOURNAL: Kagawa Daigaku Nogakubu Gakujutsu Hokoku 47 (2):p99-106 1995
ISSN: 0368-5128

(5) Regeneration of garlic plants (Allium sativum L., cv "Chonan") via cell culture in liquid medium.
AUTHOR: Cid Luis Pedro Barrueto(a); Illg Rolf Dieter; Piedrabuena Aquiles E
AUTHOR ADDRESS: (a)CENARGEN/EMBRAPA, Cx.P. 02372, CEP 70849-970, Brasilia/DF**Brazil
JOURNAL: In Vitro Cellular & Developmental Biology Plant 30P (3):p150-155 1994
ISSN: 1054-5476

(6) PLANT REGENERATION FROM CALLUS CULTURES OF ALLIUM -TRIFOLIATUM-SSP-HIRSUTUM AND ASSESSMENT OF GENETIC STABILITY BY ISOZYME POLYMORPHISM
AUTHOR: VITERBO A; RABINOWITCH H D; ALTMAN A

AUTHOR: Ayabe M; +Sumi S
CORPORATE AFFILIATE: Wakunaga
CORPORATE SOURCE: Institute for Biotechnology Research, Wakunaga Pharmaceutical Co., 1624 Shimokotachi, Koda-Cho, Takata-Gun, Hiroshima 739-1195, Japan. email:shinsumi@urban.ne.jp
JOURNAL: Plant Cell Rep. (17, 10, 773-79) 1998
ISSN: 0721-7714 CODEN: PCRPD8
LANGUAGE: English

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(29) Bulb plant propagation via tissue culture - bud culture, bulb culture, stem culture, leaf culture, flower culture, seed culture, root culture, etc.
PATENT ASSIGNEE: Mitsui-Petrochem. 1992
PATENT NUMBER: JP P4287623 PATENT DATE: 921013 WPI ACCESSION NO.: 92-387521 (9247)
PRIORITY APPLIC. NO.: JP 9151671 APPLIC. DATE: 910315
NATIONAL APPLIC. NO.: JP 9151671 APPLIC. DATE: 910315
LANGUAGE: Japanese

NPL

(30) Plantlets of garlic (Allium sativum L.) obtained in vitro.
Original Title: Plantule di aglio (Allium sativum L.) ottenute in vitro.
Maggioni, L.; Marchesi, G.
Istituto di Botanica e Genetica vegetale, Facolta di Agraria, Universita cattolica del Cuore, Piacenza, Italy.
Sementi Elette vol. 30 (5): p.29-31
Publication Year: 1984
ISSN: 0037-1890 --
Language: Italian Summary Language: english
Document Type: Journal article

(31) Regeneration of plantlets from Allium fistulosum callus .
Lin, Z. P.; Cui, Q. L.
Inst. Bot., Beijing, China.
Acta Botanica Sinica vol. 24 (6): p.586-587
Publication Year: 1982
ISSN: 0577-7496 --
Language: Chinese
Document Type: Journal article

(32) Callus and plantlet regeneration from bulb explants in Allium senescens var. minor
Nair, A.S.; Seo, B.B. (Kyungpook National Univ., Taegu (Korea Republic). Dept. of Biology)
Journal: Korean Journal of Plant Tissue Culture, Mar 1992, v. 19(2) p. 89-92
Language: English Summary Language: English, Korean

(33) Elimination of viruses from the shallot (Allium ascalonicum L.) Part 1: seeding and multiplication in vitro - disease-free plant propagation
AUTHOR: Le C L; Pelet F; Perko J
CORPORATE SOURCE: Station Federale de Recherches Agronomiques de Changins, CH-1260, Nyon, France.
JOURNAL: Rev.Suisse Vitic.Arboric.Hortic. (21, 3, 163-67) 1989
CODEN: RVAHAH
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(34) Production of virus-free garlic and field performance of micropropagated plants.

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M. Ayabe · S. Sumi

Establishment of a novel tissue culture method, stem-disc culture, and its practical application to micropropagation of garlic (*Allium sativum* L.)

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Abstract A restricted part of the undeveloped stem of the garlic clove, called the "stem disc", which is just under the basement of the immature foliage leaves, proved to be a very potent explant for the micropropagation of garlic. Twenty to thirty tissue-cultured shoots consistently were differentiated from a single clove during 1 month of culture on phytohormone-free Linsmaier and Skoog medium. In addition, more than 90% of the shoots formed bulblets in vitro during an additional 1 month of culture. Pretreatment of the garlic bulbs at 4 °C for approximately 8 weeks before preparing the stem discs enhanced both shoot development and bulblet formation. This novel method for culturing garlic was designated the stem-disc culture method. Shoot development in this type of in vitro culture apparently is divided into four stages: expansion of tissue zones surrounded by the basal parts of the immature foliage leaves, formation of dome-shaped structures, bud differentiation directly from each dome, and development into shoots and bulblets. The dome-shaped structures appeared within 5 days of the onset of culture and had developed independently into shoots approximately 1 cm high 3 weeks later. Histological observations showed that both the internal cell organization and formation process of the dome-shaped structures were similar to those in the meristem. In addition, events leading to the formation of these dome-shaped structures appeared to be initiated by vigorous cell division in the epidermis of concentric tissue zones surrounded by the basements of immature foliage leaves. The results of several field trials showed that the stem-disc culture method is useful for the production of garlic seed plants, including virus-free plantlets. Furthermore, it is a novel field cultivation system for garlic in that the seedlings produced by in vitro-induced bulblets are used as seed instead of the usual cloves.

Key words *Allium sativum* · Garlic · Micropropagation · Stem-disc culture · Tissue culture

Communicated by T. Yoshikawa

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Introduction

Garlic (*Allium sativum* L.) is an important plant widely used for both culinary and medicinal purposes because of its ability to improve the taste of food and its biological activities that include antibiotic, antitumor, cholesterol-lowering, and antithrombic effects on animal cells (Fujiwara and Natata 1967). Garlic traditionally has been cultivated vegetatively because of its sexual sterility; consequently, viral diseases are a very serious problem. Almost all commercial garlic plants have been shown to be infected with a complex of viruses such as leek yellow stripe virus (LYSV), onion yellow dwarf virus (OYDV), shallot latent virus (SLV), and garlic common latent virus (GCLV) (Walkey 1990; Sako et al. 1991; Van Dijk 1991; Conci et al. 1992; Van Dijk 1993a, b, Van Dijk and Sutarya 1992; Barg et al. 1994; Tsuneyoshi and Sumi 1996), as well as by unclassified novel rod-shaped viruses, called garlic viruses (GarVs) A–D, that we have identified (Sumi et al. 1993).

Tissue culture is a useful technique for eliminating viruses from infected plantlets and for producing virus-free garlic seedlings. Although shoot-tip culture has been used for this purpose (Bhojwani 1980; Walkey et al. 1987), the propagation rate of virus-free plantlets is very low and it is a laborious, time-consuming process. Various tissue culture techniques have been reported to improve the efficiency of propagation (Havránek and Novák 1973; Kehr and Schaeffer 1976; Abo El-Nil 1977; Nagakubo et al. 1993), but all have inherent defects as practical methods – the need for long-term cultivation, relatively low propagation rates, and the necessity of mastering skillful techniques.

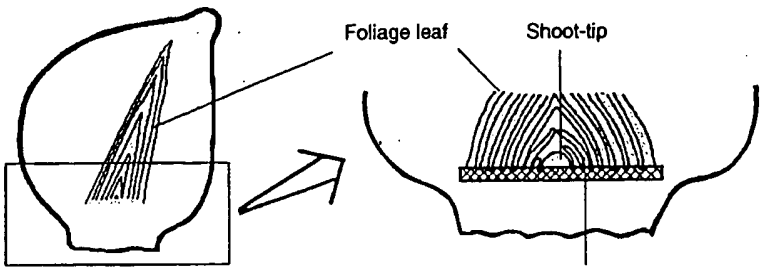


Fig. 1 Schematic depiction of garlic tissue designated the "stem disc". This is a restricted tissue (*box*) just under the basements of the immature foliage leaves approximately 1 mm thick

Xeu et al. (1991 a, b) examined the effects of garlic explants cultured in vitro on embryogenic callus formation and reported that the basal part of the clove, with or without the shoot apex, is much more potent than the storage leaf. This finding agrees with the report of Nagasawa and Finer (1988) that the basal section of in vitro garlic shoots produced by shoot-tip culture induced morphogenic callus formation. In a preliminary experiment, we observed in vitro shoots developing directly from the basal part of the foliage leaf. Taken together, these findings suggest that the basal part of the garlic clove is advantageous explant material for the micropropagation of garlic. We subsequently established a novel tissue culture method for garlic that uses the stem disc as an explant. We describe here that method and our histological observations of the shoot formation process.

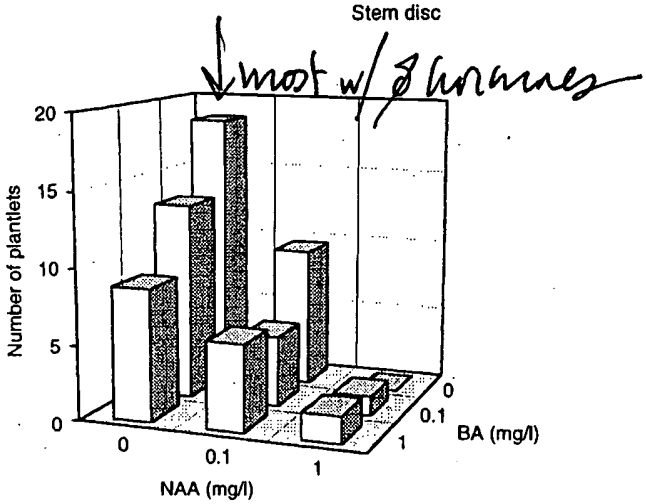


Fig. 2 Effect of phytohormone on development of in vitro shoots from a stem disc. The numbers of shoots differentiated from each stem disc explant were scored after 2 weeks of culture on solid LS media containing NAA and BA in various combinations

Materials and methods

Plant material

Garlic (*Allium sativum* L. cv 'Fukuchi-howaito') cultivated at our experimental farm in Hokkaido, Japan was used in all the experiments.

Preparation and culture of the stem disc

Garlic cloves cut into small cubes that contained the basal part of the stem were sterilized for 5 min in 70% ethanol. After removing the residual storage and foliage leaves, we excised a portion of the base approximately 1 mm thick, the stem disc (see Fig. 1). Each disc was cut into four pieces which were placed on solid Linsmaier-Skoog (LS) medium (Linsmaier and Skoog 1965) in petri dishes. The dishes were then incubated at 25 °C under a 16-h photoperiod with fluorescent illumination at 3000 lux.

Observation of the dome-shaped structure

We observed the process of shoot development both under a stereoscopic microscope and with a scanning electron microscope (SEM). For the SEM observations, stem-disc samples, taken just after preparation and cultured for 3, 4, or 5 days on LS medium, were fixed in a mixture of 5% glutaraldehyde and 4% formaldehyde. The fixed samples were dehydrated in a graded ethanol series. The critical point drying was done in liquid carbon dioxide. The dried samples were mounted on stubs, sputter-coated with gold, then observed with a Hitachi S-510 scanning electron microscope at the accelerating voltage of 15 kV.

Histological observations of the dome-shaped structure

Stem discs were fixed and dehydrated as for the SEM observations, after which they were embedded in paraffin then cut into 5-μm sections in an ultramicrotome with a diamond knife (LKB Ultratome III). The sections were double-stained with hematoxylin and eosin. We observed these samples under a stereoscopic microscope.

Results and discussion

Shoot development from stem-disc explant

Pieces of the stem disc were cultured on phytohormone-free solid LS medium or the same medium supplemented with 0.1 mg/l 1-naphthaleneacetic acid (NAA) and 0.1 mg/l 6-benzylaminopurine (BA). After 2 weeks, multiple shoot buds had formed on each explant. These buds developed into shoots approximately 1 cm high after an additional 2 weeks of culture. These shoots appeared to differentiate directly from the explant surface (data not shown).

Next, we investigated the effects of phytohormones on the differentiation of in vitro shoots. Stem-disc explants from each of five cloves were cultured on solid LS medium containing various combinations of NAA and BA at con-

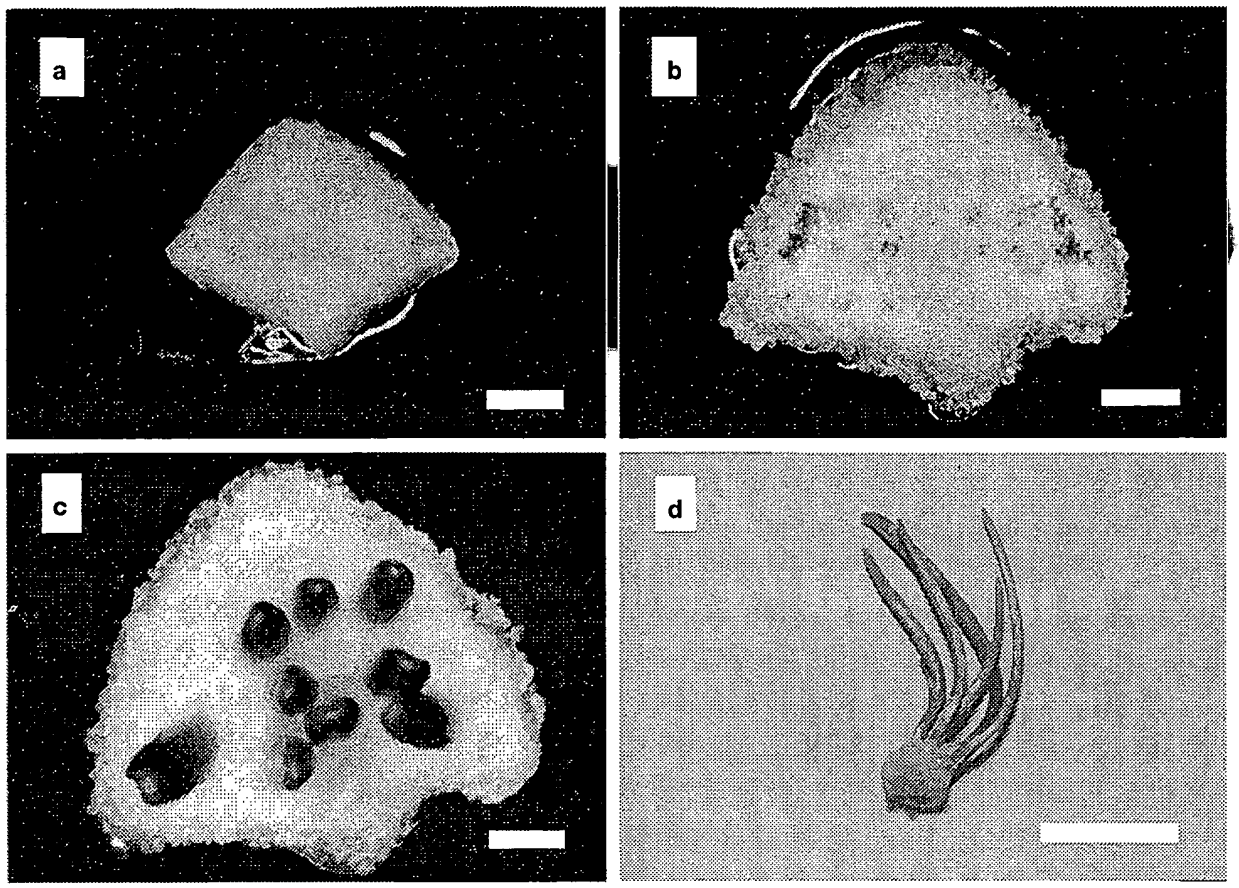


Fig. 3a–d Progressive development of in vitro shoots from a stem-disc explant. Morphological changes in one piece of a stem-disc explant cut into four pieces were observed by microscopy: a 1 day after culture, b dome-shaped structures after 1 week of culture, c green buds after 2 weeks of culture, d in vitro shoots after 3 weeks of culture. *Bar* (a–c): 1 mm; *bar* (d): 1 cm

centrations of 0, 0.1, and 1.0 mg/l. The phytohormone effects were monitored by scoring the number of differentiating shoots and observing the morphological changes that occurred in the explants during in vitro culture. Shoot scores 2 weeks after culture in the various combinations and concentrations of phytohormone are shown in Fig. 2. No one particular phytohormone supplement was observed to be distinctly better than the others under the test conditions, and more than 15 shoots, on average, differentiated from a single stem disc. Additions of NAA or BA suppressed bud formation in a dose-dependent manner. The inhibitory effect of NAA was much greater than that of BA, and an addition of 1 mg/l of NAA blocked bud differentiation almost completely. As for the morphological changes, an NAA supplement tended to promote callus formation, whereas BA elongated the residual basal parts of the foliage leaves on the stem-disc explant.

We call this novel tissue culture method for garlic "stem-disc culture". The use of the stem disc as an explant is unique and in vitro shoots differentiate with much higher efficiency and in a shorter culture period than that previously reported in other methods (Havránek and Novák 1973; Kehr and Schaeffer 1976; Abo El-Nil 1977; Nagakubo et al. 1993).

Observation of the process of shoot development from stem discs

We investigated the developmental process of in vitro shoots from stem-disc explants using microscopy. Figure 3 shows the progressive development of in vitro shoots from the stem disc. Multiple, dome-shaped structures first appeared on the surface of the stem-disc explant 1 week after culture initiation (Fig. 3b). These structures appeared concentrically on the explant, and callus was present exclusively in the regions between the developing zones of the dome structures. The structures developed rapidly and produced green buds after approximately 2 weeks of culture (Fig. 3c). The buds grew vigorously and developed into in vitro shoots approximately 1 cm high after approximately 3 weeks (Fig. 3d).

We also made SEM observations of stem discs sampled serially 0–5 days after culture to determine the morphological events that occur during the early formative stages

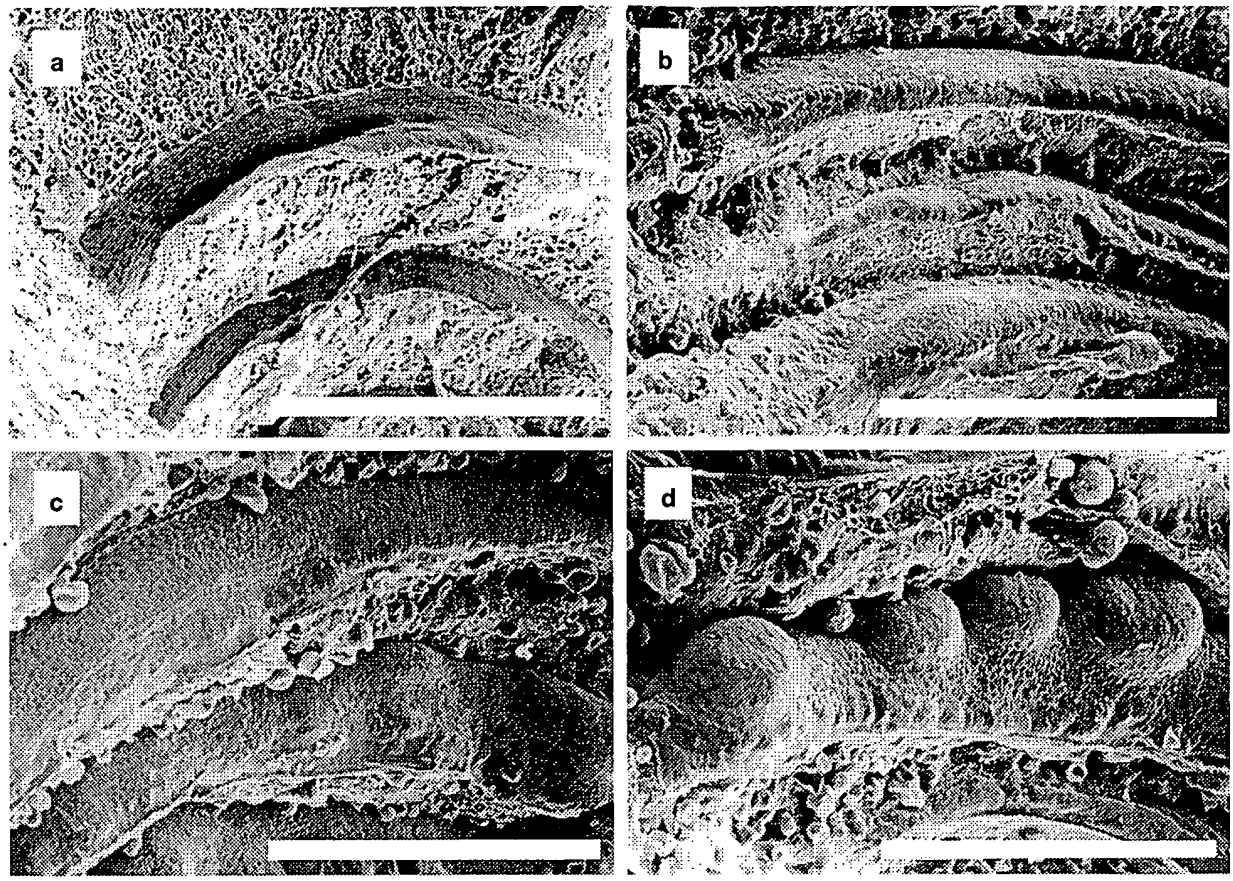


Fig. 4a–d SEM observations of the early formative stages of the dome-shaped structures on a stem-disc explant. **a** The stem-disc explant just after preparation, **b** the explant after 3 days of culture, **c** the explant after 4 days of culture, **d** the explant after 5 days of culture. *Bars:* 1 mm

of the dome-shaped structures. These changes are shown in Fig. 4. Concentric grooves of high density with smooth surfaces (Fig. 4a) are present among reticula with rough, rugged surfaces which correspond to the residual basements of the foliage leaves (see Fig. 1). Three to four days after culture, these zones were slightly enlarged, and some parts appeared protuberant (Fig. 4b, c). On day 5, the protuberances developed into dome-shaped structures approximately 0.5 mm in diameter (Fig. 4d). SEM showed that development of the in vitro shoots was restricted to regions surrounded by the basements of foliage leaves and that the morphological changes apparently occurred within the first 3 days of culture. Moreover, shoot formation events seemed to occur through differentiation rather than dedifferentiation.

Histological observations of the dome-shaped structures

To characterize the dome-shaped structures formed during stem-disc culture, we conducted histological observations of these structures at different developmental stages. Figure 5a shows a section from a stem disc just after preparation. A single distinctive cell layer composed of relatively small cells that are intensively stained with hematoxylin and eosin is present in the epidermal tissue between the basements of the foliage leaves (arrowhead). These small cells vigorously divided, multiple layers composed of intensively stained small cells appearing on day 3 of culture (Fig. 5b). As a result, the epidermal tissue bulges slightly. On day 5, a dome-shaped structure which is similar histologically to the shoot tip is present (Fig. 5c). These findings show that the dome-shaped structures apparently develop from the epidermal single-cell layer, which consists of small cells with a high potential for cell division, between the basements of the foliage leaves.

These observations and findings support our conclusion that the in vitro shoots differentiated directly from the stem-disc explants and were not produced through dedifferentiation. In addition, both the internal cell organization and formation process of the dome-shaped structures were similar to those of the meristem.

Effects of low-temperature pretreatment on stem-disc culture

It has been reported that exposure of in vitro shoots to a low temperature (5°C) for more than 4 months promoted

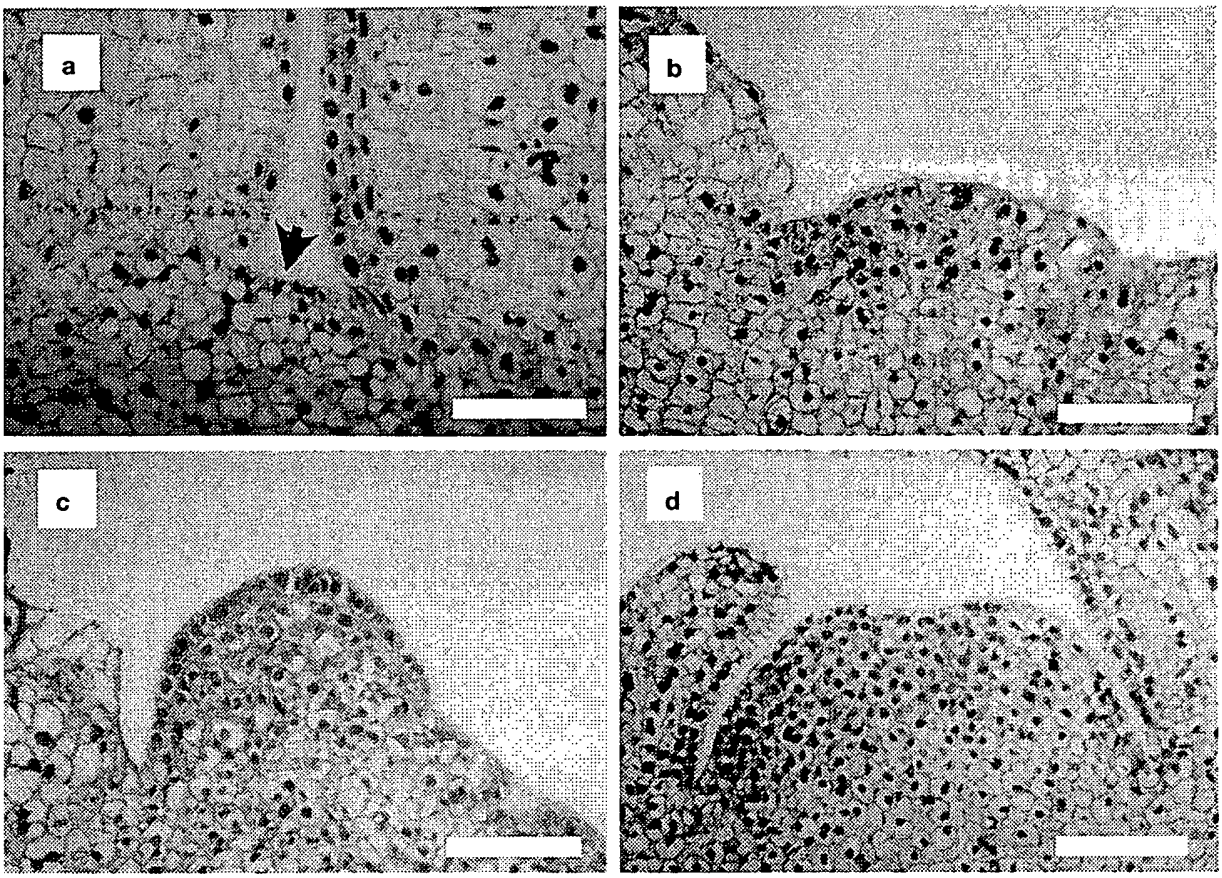


Fig. 5a–d Histological observations of the dome-shaped structures during formation. Stem-disc explants were sampled at various times during culture, and thin sections were prepared from these samples to observe histological changes. **a** Thin section from a stem disc before culture (arrowhead, see text), **b** the same section after 3 days of culture, **c** the same section after 5 days of culture, **d** the garlic shoot apex. *Bars:* 0.1 mm

garlic bulblet formation in in vitro culture (Nagakubo et al. 1993; 1997; Takagi 1990). We also found that pretreatment of garlic bulbs at 4 °C promoted bulbing in in vitro shoots produced by meristem culture. Based on these findings, we examined the effect of low-temperature pretreatment of garlic bulbs on the formation of in vitro bulblets during stem-disc culture.

Garlic bulbs were stored at either 4 °C or room temperature for 2–12 weeks before preparing the stem-disc explants. For the statistical evaluation, 25–50 cloves were examined in the respective storage conditions. We scored the total numbers of in vitro shoots differentiated from each clove after 3 weeks of culture and in vitro bulblets formed on the shoots after 8 weeks of culture. The numbers of in vitro shoots as well as in vitro bulblets were markedly increased by pretreatment at 4 °C (Fig. 6). The gradual increase in shoot number paralleled the duration of the low-temperature pretreatment, with an average of 25 shoots (SD

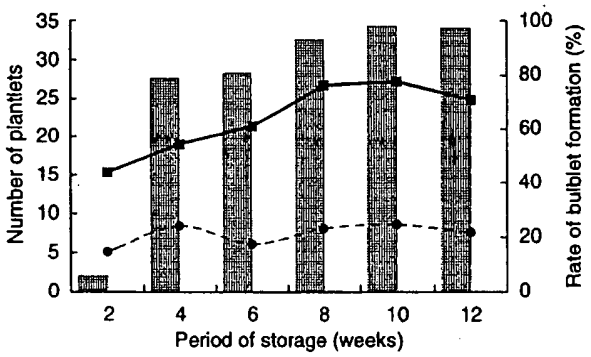


Fig. 6 Effects of low-temperature pretreatment of the differentiation of in vitro shoots and formation of in vitro bulblets. Stem-disc explants were prepared from garlic bulbs stored at either 4 °C or room temperature for 2–12 weeks, then cultured on phytohormone-free LS media. The total number of in vitro shoots was scored after 3 weeks of culture and in vitro bulblets after 8 weeks. *Solid line* stored at 4 °C, *dotted line* stored at room temperature, *haschured bar* rate of in vitro bulblet formation (average %) in explants stored at 4 °C. Explants stored at room temperature did not form any in vitro bulblets. The rate of bulblet formation was calculated by dividing the number of shoots with bulblets by the total number of in vitro shoots

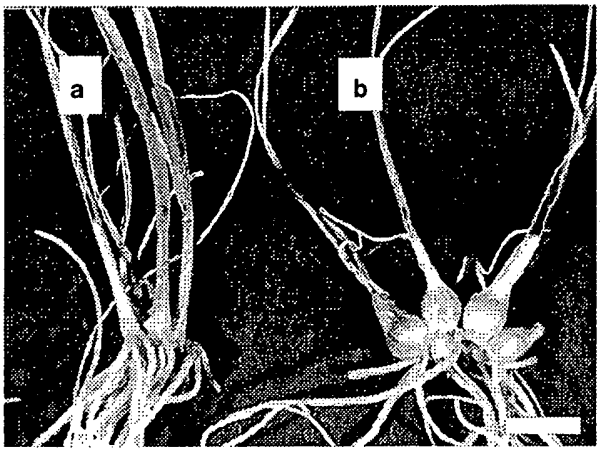


Fig. 7a, b Representative in vitro shoots produced from stem discs cultured for 2 months. a In vitro shoots from explants stored at room temperature, b in vitro shoots from explants stored at 4 °C. *Bar:* 1 cm

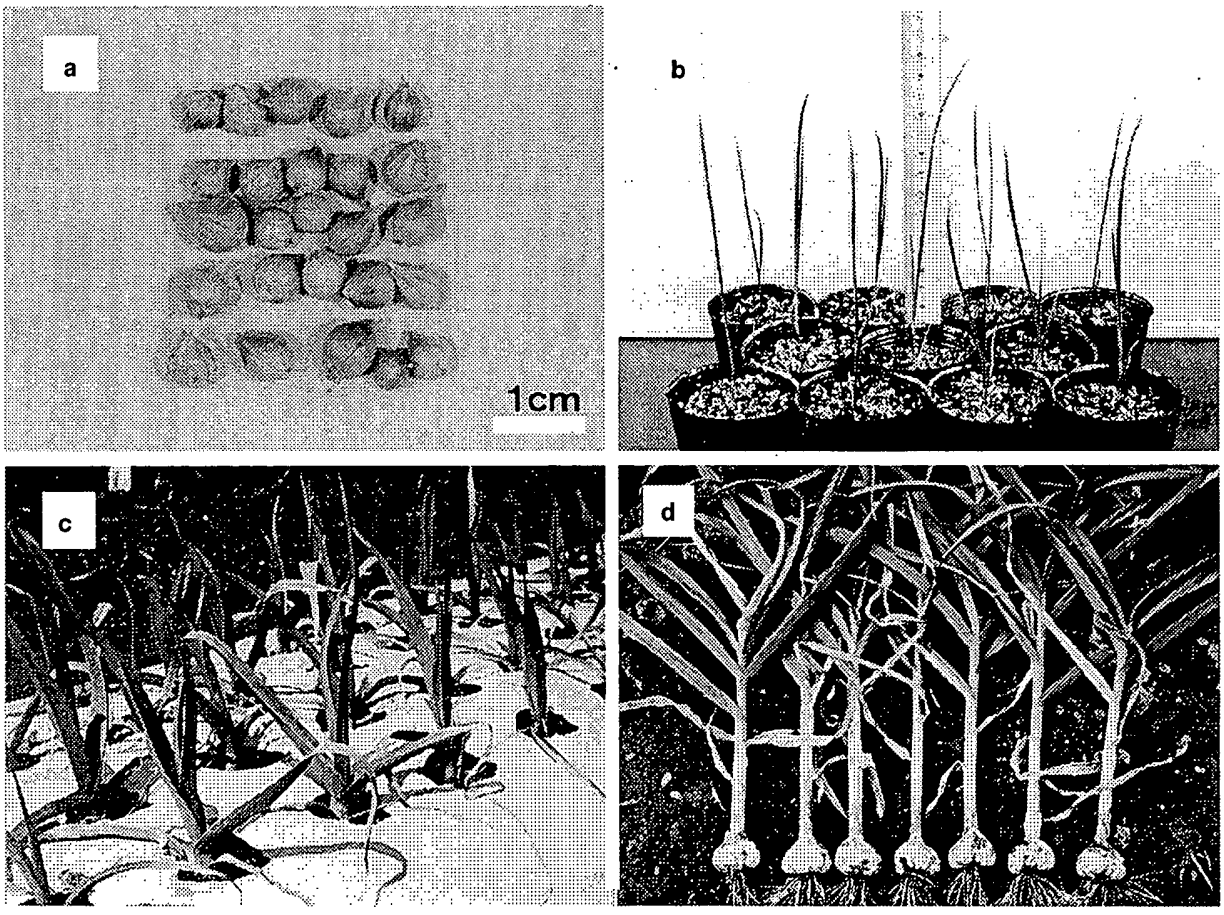
Fig. 8a–d Field cultivation of garlic shoots germinated from in vitro bulblets. a In vitro bulblets obtained from a single clove, b garlic shoots germinated from in vitro bulblets, c garlic plants growing in the field, d harvested garlic bulbs

ranges ±3.0 to ±5.1) differentiating from a single garlic clove stored for more than 8 weeks at 4 °C. The formation of in vitro bulblets was also enhanced, with more than 95% of the shoots forming bulblets after low-temperature pretreatment for more than 8 weeks. In contrast, garlic stored at room temperature showed no enhancement of differentiation of in vitro shoots. Furthermore, the shoots never formed in vitro bulblets (Fig. 7).

The stem-disc culture method combined with the pretreatment of garlic at 4 °C for approximately 8 weeks consistently produced more than 100 in vitro bulblets from each bulb, this in comparison to the bulb of the Japanese garlic cultivar 'Fukuchi-howaito' which ordinarily has only 5–6 cloves.

Field cultivation of in vitro bulblets

To evaluate the biological activities of the in vitro bulblets and their possible use as seeds in garlic production, we germinated then cultivated them in the field (Fig. 8). Sprouting shoots planted in late August to early September produced garlic bulbs, late the next June, of comparable size and weight to those obtained by the usual clove cultivation method. There were no apparent abnormalities in shoot



growth or in the resulting bulb morphology throughout the cultivation period. It should be noted that storage of the in vitro bulblets for up to 6 months did not affect their germination activities (data not shown). These findings indicate that the stem-disc culture method is of practical use for the micropropagation of garlic plants, in particular as virus-free seed plants produced by shoot-tip culture. Furthermore, this culture method has produced a novel, epoch-making garlic cultivation system, in which seedlings instead of the usual cloves are used for propagation. Because seedlings are much more easily planted by machinery than cloves, this culture system is efficacious for practical garlic cultivation, in particular large-scale cultivation.

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Set	Items	Description
S1	73379	BULB OR BULBS
S2	172046	TISSUE (W) CULTURE
S3	95531	CALLUS OR CALLI
S4	56356	ALLIUM
S5	87517	SATIVUM
S6	1374	S4 AND S2
S7	1022	S4 AND S3
S8	1875	S6 OR S7
S9	1118	RD (unique items)
S10	1118	RD S8 (unique items)
S11	245	S9 AND S1
S12	478	S10 AND S5
S13	245	RD S11 (unique items)
S14	1118	RD S10 (unique items)
S15	245	S10 AND S1
S16	478	RD S12 (unique items)

EAST

BRS L1 2190 allium USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:04
BRS L2 96905 bulb or bulbs USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:04
BRS L3 48868 tissue and culture USPAT 2003/08/11 11:05
BRS L4 4624 monocot or monocotyledon USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:07
BRS L5 6793 callus USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:07
BRS L6 4156 calli USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:07
BRS L7 71 domy USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:07
BRS L8 18625 dome adj (shape or shaped) USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:07
BRS L9 328333 tissue USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:09
BRS L10 5792749 s 3 and 1 USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:10
BRS L11 252 3 and 1 USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:10
BRS L12 37 11 and 2 USPAT; US-PGPUB; EPO; JPO; DERWENT 2003/08/11 11:10

Haas, W ndy RPPS. Ordered

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Sent: Monday, August 11, 2003 12:15 PM
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Dear People of STIC-ILL:

Please retrieve and forward to me a copy of each of the following references:

(1) Establishment of a novel tissue culture method, stem-disc culture, and its practical application to micropropagation of garlic (Allium sativum L.).
AUTHOR: Ayabe M; Sumi S(a)
AUTHOR ADDRESS: (a)Inst. Biotechnol. Res., Wakunaga Pharm. Co., 1624 Shimokotachi, Koda-Cho, Takata-Gun, Hiroshima **Japan
JOURNAL: Plant Cell Reports 17 (10):p773-779 July, 1998
ISSN: 0721-7714

(2) Thermotherapy in virus elimination from garlic: Influences on shoot multiplication from meristems and bulb formation in vitro.
AUTHOR: Robert Ucman; Zel Jana(a); Ravnikar Maja
AUTHOR ADDRESS: (a)Natl. Inst. Biol. Ljubljana, Vecna pot 111, 1000 Ljubljana**Slovenia
JOURNAL: Scientia Horticulturae (Amsterdam) 73 (4):p193-202 April 16, 1998

(3) In vitro elimination of onion yellow dwarf and shallot latent viruses in shallots (Allium cepa var. ascalonicum L.).
AUTHOR: Fletcher P J(a); Fletcher J D(a); Lewthwaite S L
AUTHOR ADDRESS: (a)New Zeal. Inst. Crop Food Res. Ltd., Private Bag 4704, Christchurch**New Zealand
JOURNAL: New Zealand Journal of Crop and Horticultural Science 26 (1):p 23-26 March, 1998
ISSN: 0114-0671

(4) Effects of plant growth regulators and cold pre-storage of bulb on callus formation of garlic.
AUTHOR: Kudou Rika; Fujime Yukihiro; Komatsu Yoshie; Fukada Noriko; Amimoto Kunihoro
AUTHOR ADDRESS: Shikoku Res. Inst. Inc., 2109 Yashima-nishimachi, Takamatsu 761-01**Japan
JOURNAL: Kagawa Daigaku Nogakubu Gakujutsu Hokoku 47 (2):p99-106 1995
ISSN: 0368-5128

(5) Regeneration of garlic plants (Allium sativum L., cv "Chonan") via cell culture in liquid medium.
AUTHOR: Cid Luis Pedro Barrueto(a); Illg Rolf Dieter; Piedrabuena Aquiles E
AUTHOR ADDRESS: (a)CENARGEN/EMBRAPA, Cx.P. 02372, CEP 70849-970, Brasilia/DF**Brazil
JOURNAL: In Vitro Cellular & Developmental Biology Plant 30P (3):p150-155

1994
ISSN: 1054-5476

(6) PLANT REGENERATION FROM CALLUS CULTURES OF ALLIUM -TRIFOLIATUM-SSP-HIRSUTUM AND ASSESSMENT OF GENETIC STABILITY BY ISOZYME POLYMORPHISM
AUTHOR: VITERBO A; RABINOWITCH H D; ALTMAN A
AUTHOR ADDRESS: DEP. FIELD VEG. CROPS, THE HEBREW UNIVERSITY JERUSALEM, REHOVOT, ISRAEL.
JOURNAL: PLANT BREEDING 108 (4). 1992. 265-273. 1992
FULL JOURNAL NAME: Plant Breeding
CODEN: PLABE

(7) 3710257 21810312 Holding Library: AGL
Regeneration of plantlets and bulblets from explants and callus of Allium aflatunense cultivars and selection from indigenous israeli Allium ampeloprasum
Evenor, D. Levi-Nissim, A.; Afgin, L.; Lilien-Kipnis, H.; Watad, A.A.
ARO, Bet Dagan, Israel.
Leuven, Belgium : International Society for Horticultural Science.
Acta horticulturae. 1997. (430) p. 325-330.
ISSN: 0567-7572 CODEN: AHORA2
DNAL CALL NO: 80 Ac82

(8) In vitro bulb production from Allium spp
Mohamed-Yasseen, Y. Barringer, S.A.; Splittstoesser, W.E.
University of Illinois, Urbana, IL.
Columbia, MD : Tissue Culture Association, c1991-
In vitro cellular & developmental biology. Plant : journal of the Tissue Culture Association. Jan 1995. v. 31 (1) p. 51-52.
ISSN: 1054-5476 CODEN: IVCPEO
DNAL CALL NO: QK725.I43
Language: English

(9) Regeneration of Allium spp. in vitro by slicing the basal plate
Barringer, S.A. Mohamed-Yasseen, Y.; Schloupt, R.M.; Splittstoesser, W.E.
Ohio State University, Columbus, OH.
Binghamton, NY : Food Products Press, c1995-
Journal of vegetable crop production. 1996. v. 2 (1) p. 27-33.
ISSN: 1049-6467

(10) Thirty years of France' experience in the production of disease-free garlic and shallot mother bulbs
Messiaen, C.M. Lot, H.; Delecolle, B.
Wageningen : International Society for Horticultural Science.
Acta horticulturae. Mar 1994. (358) p. 275-279.
ISSN: 0567-7572 CODEN: AHORA2
DNAL CALL NO: 80 Ac82
Language: English

(11) Some factors affecting productivity of Allium cepa L. callus cultures
Gbolade, A.A. Lockwood, G.B.
Obafemi Awolowo University, Ile-Ife, Nigeria
Wheaton, Ill. : Allured Publishing Company.
Journal of essential oil research : JEOR. July/Aug 1992. v. 4 (4) p. 381-385.
ISSN: 1041-2905

(12) Title: IN-VITRO PROPAGATION AND BULB FORMATION OF GARLIC
Author(s): SEABROOK JEA
Corporate Source: AGR CANADA,RES STN,POB 20280/FREDERICTON E3B 4Z7/NB/CANADA/
Journal: CANADIAN JOURNAL OF PLANT SCIENCE, 1994, V74, N1 (JAN), P155-158
ISSN: 0008-4220
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

(13) Title: SOMATIC EMBRYOGENESIS AND PLANT-REGENERATION IN BASAL PLATE AND RECEPTACLE DERIVED- CALLUS CULTURES OF GARLIC (ALLIUM -SATIVUM L)
Author(s): XUE HM; ARAKI H; SHI L; YAKUWA T
Corporate Source: HOKKAIDO UNIV,FAC AGR/SAPPORO/HOKKAIDO 060/JAPAN/; AGR COLL INNER MONGOLIA/HOHHOT//PEOPLES R CHINA/
Journal: JOURNAL OF THE JAPANESE SOCIETY FOR HORTICULTURAL SCIENCE, 1991, V 60, N3, P627-634
Language: JAPANESE Document Type: ARTICLE (Abstract Available)

(14) In vitro bulb formation in garlic (Allium sativum L.) cultivar Gigante Roxo.
Original Title: Bulbificacao "in vitro" de alho (Allium sativum L.) cultivar Gigante Roxo.
Camara, F. A. A.; Pasqual, M.; Ishida, J. S.; Bastos, E. G.
Departamento de Agricultura da Escola Superior de Agricultura de Lavras, CP 37, 37200-000 Lavras, MG, Brazil.
Revista Ceres vol. 40 (232): p.566-574
Publication Year: 1993
ISSN: 0034-737X --
Language: Portuguese Summary Language: english
Document Type: Journal article

(15) The effect of growth regulators and the conditions of stock bulb storage on callus growth of garlic in vitro.
Lee, E. M.; Ra, S. W.; Lee, J. Y.; Min, S. R.; Song, N. H.; Lee, Y. B.
Chungnam Provincial Rural Development Administration, Daejeon, Korea Republic.
Research Reports of the Rural Development Administration, Horticulture vol. 30 (3): p.90-95
Publication Year: 1988
ISSN: 1010-562X --
Language: Korean Summary Language: english
Document Type: Journal article

(16) Plant regeneration of Allium victorialis var. platyphyllum Makino via organogenesis and somatic embryogenesis - leaf culture, shoot tip culture and bulb culture comparison for callus culture formation and propagation (conference abstract)
AUTHOR: Lim H T; Lee E A; Kim W B
CORPORATE AFFILIATE: Univ.Kangwon-Nat. Nat.Alpine-Agr.Exp.Sta.Kangwon
CORPORATE SOURCE: Department of Horticulture, Kangwon National University, Chuncheon, 200-701, Republic of Korea.
JOURNAL: Hortscience (31, 4, 628) 1996
ISSN: 0018-5345 CODEN: HJHSAR
CONFERENCE PROCEEDINGS: American Society for Horticultural Science (ASHS), 93rd Annual Conference, Lexington, KY, 6-10 October, 1996.
LANGUAGE: English

(17) Induction of onion (Allium cepa L. cv. Granex 33) callus formation and embryogenesis.
Juntawong, N.; Kaumanee, P.; Nanankorn, M.; Khewhok, S.
Department of Botany, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.
Kasetsart Journal, Natural Sciences vol. 27 (4): p.463-468
Publication Year: 1993
ISSN: 0075-5192 --
Language: Thai Summary Language: english
Document Type: Journal article

(18) The production and proliferation of bulbs from receptacles of virus-free garlic plants.
Matsubara, S.; Chen, D.; Masuda, M.; Murakami, K.
Faculty of Agriculture, Okayama University, Kurashiki, Okayama 710, Japan.
Okayama Daigaku Nogakuba Gakujutsu Hokoku = Scientific Reports of the Faculty of Agriculture, Okayama University (No. 75): p.9-13
Publication Year: 1990 --
Language: Japanese Summary Language: english
Document Type: Journal article

(19) Techniques for producing virus-free garlic.
Ding, X. S.; Walkey, D. G. A.; Webb, M. J. W.; Bolland, C. T.
Hort. Res. Inst., Shanghai Acad. Agric. Sci., Shanghai, China.
Acta Agriculturae Shanghai vol. 4 (1): p.23-28
Publication Year: 1988
ISSN: 1000-3924 --
Language: Chinese Summary Language: english
Document Type: Journal article

(20) A method for the rapid large-scale production of healthy strain artificial species garlic by tissue culture technology - bulb culture, callus culture and propagation
CORPORATE SOURCE: Korea.
PATENT ASSIGNEE: Tong-Yang-Muhlsan 1996

PATENT NUMBER: JP 8205703 PATENT DATE: 960813 WPI ACCESSION NO.: 97-036785 (9704)
PRIORITY APPLIC. NO.: KR 25775 APPLIC. DATE: 941008
NATIONAL APPLIC. NO.: JP 95273656 APPLIC. DATE: 950928
LANGUAGE: JA

(21) Multiplication of bulb plants using plant tissue culture - and a culture medium which contains abscisic acid; application to e.g. Colocasia esculenta, Caladium bicolor, Allium cepa, Lilium auratum
PATENT ASSIGNEE: Kyowa-Hakko 1986
PATENT NUMBER: JP 61056022 (Kokai) PATENT DATE: 860320
WPI ACCESSION NO.: 86-115912 (8618)
PRIORITY APPLIC. NO.: JP 84175639 APPLIC. DATE: 840823
NATIONAL APPLIC. NO.: JP 84175639 APPLIC. DATE: 840823
LANGUAGE: Japanese

(22) Micropropagation of onion through in vitro bulblet formation - bulb scale culture (conference abstract)
AUTHOR: Pinto J E B P; Rodrigues B M
CORPORATE AFFILIATE: Super.Agr.Coll.Lavras
CORPORATE SOURCE: Laboratory of Tissue Culture, ESAL, Cx. P. 37, Lavras MG, 37200-000 Brazil.
JOURNAL: In Vitro (31, 3, Pt.2, 83A) 1995
ISSN: 0883-8364 CODEN: ITCSAF
CONFERENCE PROCEEDINGS: Congress on In Vitro Biology, 1995 Meeting, Denver, Colorado, May 20-24, 1995.
LANGUAGE: English

(23) Tissue culture studies on Allium sativum Linn - callus characterization (conference abstract)
AUTHOR: Qadry J S; Zafar R; +Chitnis S T
CORPORATE SOURCE: Hamdard College of Pharmacy, Hamdard Nagar, New Delhi 110 062, India.
JOURNAL: Indian J.Pharm.Sci. (46, 1, 51-52) 1984
CODEN: IJSIDW
LANGUAGE: English

(24) Multiplication of garlic (Allium sativum L.) from bulbils obtained in vitro.
Original Title: Multiplicacion del ajo (Allium sativum L.) a partir de bulbillos obtenidos in vitro.
Munoz, C.; Escaff, M.
Estacion Exp. La Platina, Chile.
Simiente vol. 57 (3): p.106
Publication Year: 1987
ISSN: 0037-5403 --
Language: Spanish
Document Type: Abstract only

(25) Garlic embryogenesis and virus-free plant regeneration - virus elimination in scape tip culture and leaf culture-derived callus culture and

somatic embryogenesis for propagation (conference abstract)
AUTHOR: Wang H L; Zhang S; Kang Y Q
CORPORATE AFFILIATE: Univ.British-Columbia Pulp+Paper-Res.Inst.Canada Tianjin-Inst.Educ.
CORPORATE SOURCE: Forest Product Biotechnology, University of British Columbia, Pulp and Paper Research Institute of Canada, 3800 Wesbrook Mall, Vancouver, V6S 2L9, Canada.
JOURNAL: In Vitro (33, 3, Pt.2, 74A) 1997
ISSN: 0883-8364 CODEN: ITCSAF
CONFERENCE PROCEEDINGS: In Vitro Biology Congress, Society for In Vitro Biology, 1997 Meeting, Washington, DC, 14-18 June, 1997.
LANGUAGE: English

(26) Dedifferentiated Allium sp. plant propagation - garlic, onion, Allium chinense or Allium ampeloprasum leaf base culture
PATENT ASSIGNEE: Wakunaga-Pharm. 1994
PATENT NUMBER: JP 6197650 PATENT DATE: 940719 WPI ACCESSION NO.: 94-268612 (9433)
PRIORITY APPLIC. NO.: JP 93175577 APPLIC. DATE: 930715
NATIONAL APPLIC. NO.: JP 93175577 APPLIC. DATE: 930715
LANGUAGE: Japanese

(27) Effect of explant source and shoot trimming on shoot multiplication and bulb formation of garlic in vitro.
Choi, S. L.; Paek, K. Y.; Kwun, K. C.; Son, S. G.; Cho, J. T.
Chung Buk National University, Cheongju 520, Chung Buk, Korea Republic.
Journal of the Korean Society for Horticultural Science vol. 26 (4): p.304-312
Publication Year: 1985
ISSN: 0253-6498 --
Language: Korean Summary Language: english
Document Type: Journal article
Display 15/3/222 (Item 3 from file: 357)
DIALOG(R)File 357:Derwent Biotech Res.

(28) Establishment of a novel tissue culture method, stem-disk culture, and its practical application to micropropagation of garlic (Allium sativum L.) - stem cell culture propagation useful for the large scale shoot-tip culture for garlic cultivation
AUTHOR: Ayabe M; +Sumi S
CORPORATE AFFILIATE: Wakunaga
CORPORATE SOURCE: Institute for Biotechnology Research, Wakunaga Pharmaceutical Co., 1624 Shimokotachi, Koda-Cho, Takata-Gun, Hiroshima 739-1195, Japan. email:shinsumi@urban.ne.jp
JOURNAL: Plant Cell Rep. (17, 10, 773-79) 1998
ISSN: 0721-7714 CODEN: PCRPD8
LANGUAGE: English

(29) Bulb plant propagation via tissue culture - bud culture, bulb culture, stem culture, leaf culture, flower culture, seed culture, root culture, etc.

PATENT ASSIGNEE: Mitsui-Petrochem. 1992
PATENT NUMBER: JP P4287623 PATENT DATE: 921013 WPI ACCESSION NO.: 92-387521 (9247)
PRIORITY APPLIC. NO.: JP 9151671 APPLIC. DATE: 910315
NATIONAL APPLIC. NO.: JP 9151671 APPLIC. DATE: 910315
LANGUAGE: Japanese

(30) Plantlets of garlic (Allium sativum L.) obtained in vitro.
Original Title: Plantule di aglio (Allium sativum L.) ottenute in vitro.
Maggioni, L.; Marchesi, G.
Istituto di Botanica e Genetica vegetale, Facolta di Agraria, Universita cattolica del Cuore, Piacenza, Italy.
Sementi Elette vol. 30 (5): p.29-31
Publication Year: 1984
ISSN: 0037-1890 --
Language: Italian Summary Language: english
Document Type: Journal article

(31) Regeneration of plantlets from Allium fistulosum callus .
Lin, Z. P.; Cui, Q. L.
Inst. Bot., Beijing, China.
Acta Botanica Sinica vol. 24 (6): p.586-587
Publication Year: 1982
ISSN: 0577-7496 --
Language: Chinese
Document Type: Journal article

(32) Callus and plantlet regeneration from bulb explants in Allium senescens var. minor
Nair, A.S.; Seo, B.B. (Kyungpook National Univ., Taegu (Korea Republic). Dept. of Biology)
Journal: Korean Journal of Plant Tissue Culture, Mar 1992, v. 19(2) p. 89-92
Language: English Summary Language: English, Korean

(33) Elimination of viruses from the shallot (Allium ascalonicum L.) Part 1: seeding and multiplication in vitro - disease-free plant propagation
AUTHOR: Le C L; Pelet F; Perko J
CORPORATE SOURCE: Station Federale de Recherches Agronomiques de Changins, CH-1260, Nyon, France.
JOURNAL: Rev.Suisse Vitic.Arboric.Hortic. (21, 3, 163-67) 1989
CODEN: RVAHAH
LANGUAGE: French

(34) Production of virus-free garlic and field performance of micropropagated plants.
Bhojwani, S. S.; Cohen, D.; Fry, P. R.
Pl. Physiol. Div., DSIR, Palmerston North, New Zealand.
Scientia Horticulturae vol. 18 (1): p.39-43
Publication Year: 1982

ISSN: 0304-4238 --
Language: English
Document Type: Journal article

(35) Organogenesis and embryogenesis in callus cultures of garlic (Allium sativum L.).
Abo el-Nil, M. M.
Pl. Path. Dep., Univ. Fla., Gainesville, USA.
Plant Science Letters vol. 9 (3): p.259-264
Publication Year: 1977 --
Language: English
Document Type: Journal article

(36) Studies of In Vitro Multiplication in Garlic. The effects of sampling positions and plant growth regulator on shoot formation.
KUDO RIKA (1)
(1) Shikoku Research Inst. Inc.
Shikoku Sogo Kenkyujo Kenkyu Kiho, 1994, NO.62, PAGE.80-86, FIG.5, TBL.5, REF.8
JOURNAL NUMBER: S0005ACT ISSN NO: 0285-6794
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper

(37) Organogenesis and embryogenesis in callus cultures of garlic (Allium sativum L.).
El-Nil, M. M. A.
Florida University, Gainesville, Florida 32611, USA.
Plant Science Letters vol. 9 (3): p.259-264
Publication Year: 1977 --
Language: English
Document Type: Journal article

(38) Micropropagation of garlic.
HATAYAMA ETSUKO (1); HATAYAMA KAZUMI (1); ITO AKIKO (1); MASUDA KIYOSHI (1); INOUE MASAYASU (1)
(1) Akita Prefect. Agric. Jr. Coll., Biotechnol. Res. Inst.
Seibutsu Kogaku Kenkyujo Nenpo, 1995, NO.2(1990/1994), PAGE.7-8,1(1), FIG.1
JOURNAL NUMBER: L2495AAP
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Annual Report
ARTICLE TYPE: Short Communication
MEDIA TYPE: Printed Publication

(39) In vitro Formation of Shoot and Bulblet in Garlic.
FUJIME YUKIHIRO (1); KUDO RIKA (1); OKUDA NOBUYUKI (1)
(1) Fac. of Agric., Kagawa Univ.
Shokubutsu Soshiki Baiyo(Plant Tissue Culture Letters), 1993, VOL.10,NO.1, PAGE.9-16, FIG.8, TBL.5, REF.8

JOURNAL NUMBER: L0316AAJ ISSN NO: 0289-5773 CODEN: SSBAE
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8 581.14
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

(40) In vitro system of producing garlic (Allium sativa L.) planting materials

Patena, L.F.; Bariring, A.L.; Lapitan, V.C.; Tejano, M.P.; Tandang, C.A.; Torio, M.G.; Barba, R.C. (Philippines Univ. Los Banos, College, Laguna 4031, Laguna (Philippines). Inst. of Plant Breeding)

Conference Title: 12. Annual Scientific Conference of the Federation of Crop Science Societies of the Philippines

Conference Location and Year: Davao City (Philippines), 13-17 May 1996

Journal: Philippine Journal of Crop Science, May 1996, v. 21(supplement no. 1) p. 65

Language: English

(41) Development and Establishment of Practical Tissue Culture Methods for Production of Virus-Free Garlic Seed Bulbs , a Novel Field Cultivation System and Convenient Methods for Detecting Garlic Infecting Viruses.

SUMI S (1); TSUNEYOSHI T (1); SUZUKI A (1); AYABE M (1)
(1) Healthcare Res. Inst. Wakunaga Pharmaceutical Co., Ltd., Hiroshima, Jpn
Plant Biotechnol, 2001, VOL.18,NO.3, PAGE.179-190, FIG.13, TBL.1, REF.48
JOURNAL NUMBER: L0316ABA ISSN NO: 1342-4580 CODEN: PLBIF
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8 581.16 632.38
LANGUAGE: English COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Review article
MEDIA TYPE: Printed Publication

(42) Efficient Plant Regeneration from Callus Cultures in Garlic (Allium sativum L.).

SATO KENJI (1); ENDO TAKESHI (1); KUSAYANAGI TOMOKO (1); SHIMODA JUN'ICHI (1)
(1) Ishikawajima-Harima Heavy Ind. Co., Ltd., Tech. Dev.
Shokubutsu Soshiki Baiyo(Plant Tissue Culture Letters), 1995, VOL.12,NO.3, PAGE.259-265, FIG.2, TBL.4, REF.22
JOURNAL NUMBER: L0316AAJ ISSN NO: 0289-5773 CODEN: SSBAE
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8 581.16
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal

(43) Somatic Embryogenesis and Plant Regeneration in Basal Plate and Receptacle Derived- Callus Cultures of Garlic (Allium sativum L.).

ARAKI HAJIME (1); YAKUWA TOSHIRO (1); XUE H-M (2); SHI L (2)
(1) Hokkaido Univ., Faculty of Agriculture; (2) Agricultural Coll. Inner Mongolia, Hohhot, CHN
Engei Gakkai Zasshi(Journal of the Japanese Society for Horticaltural

Science), 1991, VOL.60,NO.3, PAGE.627-634, FIG.2, TBL.6, REF.24
JOURNAL NUMBER: F0626AAZ ISSN NO: 0013-7626 CODEN: EGKZA
UNIVERSAL DECIMAL CLASSIFICATION: 635.1/.8 581.14
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

(44) Plant regeneration from bulb explants of Allium victorialis var. platyphyllum Makino
Kim, W.B.; Kim, J.G.; Lee, E.A.; Kim, B.H.; Kim, J.K. (Rural Development Administration, Pyeongchang (Korea Republic). Alpine Agricultural Experiment Station); Lim, H.T. (Kangwon National University, Chuncheon (Korea Republic). College of Agriculture and Life Sciences)
Journal: Korean Journal of Plant Tissue Culture, Mar 1996, v. 23(2) p. 123-127
Language: Korean Summary Language: English, Korean

(45) Regeneration of virus-free plants by tissue culture from garlic bulbs infected with garlic latent virus and garlic mosaic virus
Chang, M.U.; Park, W.W. (Yeungnam Univ., Kyongsan (Korea Republic). Dept. of Biology); Chung, J.D. (Kyungpook Nat'l Univ., Taegu (Korea Republic). Dept. of Horticulture); Oh, J.Y. (Kyungpook Provincial Rural Development Administration, Taegu (Korea Republic). Dept. of Horticulture Crop)
Journal: Korean Journal of Plant Pathology, Jun 1992, v. 8(2) p. 123-130
Language: Korean Summary Language: English, Korean

(46) (INDUCTION DE CALS ET REGENERATION DE PLANTES A PARTIR DES ECAILLES DES BULBES D'AIL, ALLIUM SATIVUM L.)
ZHOU YUN-LUO; QIAN YING-QIAN; CAI QI-GUI; WU SU-XUAN
ACAD. SINICA, INST. BOTANY,CHINA
Journal: CHIH WU HSUEH PAO, 1980, 22 (4) 402-403
Language: CHINESE

(47) Effects of plant growth regulators and cold pre-storage of bulb on callus formation of garlic.
FUJIME YUKIHIRO (1); KOMATSU YOSHIE (1); FUKADA NORIKO (1); KUDO RIKA (2); AMIMOTO KUNIHIRO (2)
(1) Fac. of Agric., Kagawa Univ.; (2) Shikoku Research Inst. Inc.
Kagawa Daigaku Nogakubu Gakujutsu Hokoku(Technical Bulletin of Faculty of Agriculture, Kagawa University), 1995, VOL.47,NO.2, PAGE.99-106, FIG.4, TBL.4, REF.10
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(48) Production of virus-free garlic(Allium sativum L.) by tissue culture .
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(1) Nagasaki Agricultural and Forestry Exp. Stn.

Nagasakiken Sogo Norin Shikenjo Kenkyu Hokoku. Nogyo Bumon(Bulletin of the Nagasaki Agricultural & Forestry Experiment Station. Sect of Agriculture. Sect of Agriculture), 1989, NO.17, PAGE.1-21, FIG.9, TBL.25, REF.20
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(49) Effects of hormone concentration and parts of a bulb on regeneration of garlic callus .
KUGINUKI YASUHISA (1); NISHIMURA SHIGEO (1); ODA YOSHINOBU (2)
(1) Yasaichagyoshi; (2) Hokkaidoshokubutsuidenshigense
Jpn J Breed, 1989, VOL.39,bessatsu 1, PAGE.26-27, FIG.2, TBL.2
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